Chapter 2
Executing, Comparing, and Reusing Linked-Data-Based Recommendation Algorithms With the Allied Framework

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ABSTRACT
Data published on the web following the principles of linked data has resulted in a global data space called the Web of Data. These principles led to semantically interlink and connect different resources at data level regardless their structure, authoring, location, etc. The tremendous and continuous growth of the Web of Data also implies that now it is more likely to find resources that describe real-life concepts. However, discovering and recommending relevant related resources is still an open research area. This chapter studies recommender systems that use linked data as a source containing a significant amount of available resources and their relationships useful to produce recommendations. Furthermore, it also presents a framework to deploy and execute state-of-the-art algorithms for linked data that have been re-implemented to measure and benchmark them in different application domains and without being bound to a unique dataset.

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INTRODUCTION

The Web of Data has emerged as a way to make the Web machine-readable, relying on structured data that follow the Linked Data principles (Moyano, Sicilia, & Barriocanal, 2018). Thanks to the rise of the Web of Data, users are more likely to find resources that describe or represent real-life concepts.

However, due to the increase in the amount of structured data published on the Web, discovering and recommending related resources is still an open research area (Ricci, Rokach & Shapira, 2011). This problem can be addressed by analyzing the categories of resources, their explicit references to other resources and by combining both approaches (Figueroa, Vagliano, Rodríguez Rocha & Morisio, 2015). Accordingly, many works are addressing this problem, typically focusing on specific application domains and datasets. In contrast, we seek a solution which can fit more than one domain and dataset and we intend to generalize existing approaches. In this context, the research described in this chapter aims to answer the following research questions:

- How can we choose state-of-the-art algorithms for discovering and recommending resources from the web based on the characteristics of a given application domain and a given dataset?
- How can we benchmark the existing algorithms to select the one that best suits specific discovering and recommendation needs?
- How can we develop an algorithm that is dynamically adaptable to the characteristics of the dataset and independent of the application domain?

This chapter presents a framework named AllLied for deploying and executing recommendation algorithms based on Linked Data. This framework allows developers and researchers to test different configurations of these algorithms in a range of application domains and datasets. Additionally, AllLied provides a set of APIs to be exploited as the primary component for Recommender Systems (RS)’ architectures: developers do not need to deal with the execution platform of the algorithms but only focus their efforts either on selecting the algorithm that best fits their needs or on writing a customized one.

After conducting an in-depth analysis of the state-of-the-art recommendation algorithms executed in AllLied, the authors proposed a generic resource discovery and recommendation algorithm named ReDyAI which dynamically adapts itself to the characteristics of the dataset and the application domain.

This chapter additionally provides an overview of the research problem in discovering and recommending resources as well as the various existing types of RS. It gives a detailed review of the Linked Data based RS and summarizes the results of an evaluation of ReDyAI deployed in the AllLied framework. Finally, this chapter shows how it is possible to choose the more appropriate state-of-the-art resource recommendation algorithms for a given application domain and dataset by measuring its performance and accuracy.